

ABSTRACT

A method of forming a barrier metal employed in a wiring structure of a semiconductor device is provided. The barrier metal is formed of nitride containing refractory metal. The barrier metal is interposed between a first metal layer and a second metal layer which are electrically connected to each other. The first and second metal layers and an insulating layer are formed on a substrate of the semiconductor device. The barrier metal prevents diffusion of metal or oxygen between the first and second metal layers or between the first metal layer and the insulating layer. The substrate on which the first metal layer and one of the second metal layer and the insulating layer are formed is carried into a processing apparatus. The substrate is heated and an inside of the processing apparatus into which the substrate is carried is vacuumized. A film containing refractory metal on the first metal layer and one of the second metal layer and the insulating layer is formed on the substrate by supplying reduction gas and gas containing the refractory metal into the processing apparatus. The film containing the refractory metal is nitrified by supplying gas containing nitrogen into the processing apparatus after forming the film containing the refractory metal, thereby forming nitride.